

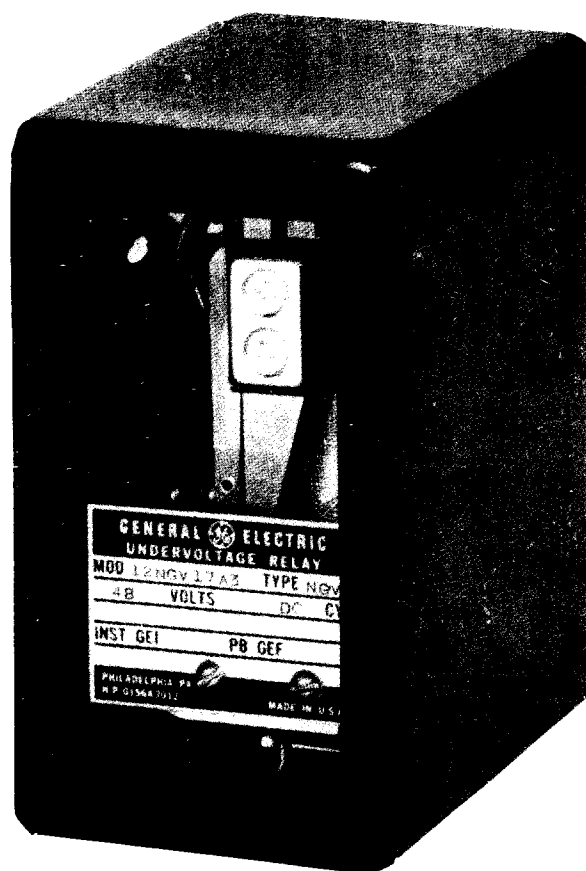


## INSTRUCTIONS

GEI-90804E  
Supersedes GEI-90804D

### D.C. UNDERVOLTAGE RELAY

NGV17A, NGV17B, NGV17C



GENERAL  ELECTRIC

## DESCRIPTION

The NGV17 relay is an instantaneous DC undervoltage relay with extra high dropout designed specifically to be used to monitor the DC charging supply for a station battery, to sound an alarm if this supply fails.

The telephone-type voltage unit has a zener regulator in series with the operating coil and the fixed and adjustable resistors. Also the relay has one normally-open and one normally-closed contact, but no target. It is packaged in a molded case, either flush or surface mounted. It is normally used in conjunction with one time-delay dropout auxiliary relay.

The NGV17B relay differs from the NGV17A by having two normally-closed contacts instead of one.

The NGV17C relay is the same as the NGV17A except the connections are made from the front.

## APPLICATION

Because the NGV17 picks up at 105% of dropout voltage or less, it finds application wherever a high-speed, extra high dropout, DC relay is required.

Usually the NGV17 relay is used to detect station battery undervoltage and to provide an alarm. Since some operating conditions may temporarily lower the DC voltage, it is suggested that the NGV17A be used in conjunction with a time-delay auxiliary relay to prevent false alarms.

Figure 9 shows the NGV17 used in conjunction with a time-delay dropout HFA65D relay which provides a time delay of about two seconds and at the same time monitors the AC supply to the battery charger. This arrangement will sound an alarm not only when a prolonged DC undervoltage occurs, but also when the AC power is lost, without waiting for the battery voltage to decay.

When the NGV17 relay is used to monitor either a lead-acid or a nickel-cadmium battery, it is suggested that the dropout be set about 98% of the fully charged open-circuit voltage of the battery. For example, the fully charged open-circuit voltage of a 60 cell lead-acid battery will be 123 volts and the suggested NGV17 setting about 121 volts. Also, the relay must pick up at the lowest acceptable battery charger output.

Cover Photo: 8031285

*These instructions do not purport to cover all details or variations in equipment nor provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.*

*To the extent required the products described herein meet applicable ANSI, IEEE and NEMA standards; but no such assurance is given with respect to local codes and ordinances because they vary greatly.*

## RATINGS

Table I gives the rated voltage and the calibration ranges for the NGV17 relays.

TABLE I

RATED VOLTS D.C.	CALIBRATION RANGE DROPOUT VOLTS
12	9.5 - 13.5
24	19 - 27
32	22 - 38
48	38 - 54
110	88 - 122
125	100 - 140
220	175 - 250
250	150 - 200
250	150 - 210
250	200 - 280

Table II gives the relay contact interrupting ratings. These contacts will make and carry 3 amperes continuously or 30 amperes for 2 seconds.

TABLE II  
INTERRUPTING RATINGS

AC VOLTS	AMPS	
	INDUCTIVE**	NON-INDUCTIVE
115	0.75	2.0
230	0.5	1.5
DC VOLTS		
48	1.0	3.0
110	0.5	1.5
125	0.5	1.5
220	0.25	1.0
250	0.25	1.0

\*\* The inductive rating is based on the inductive of an average tripping coil.

## CHARACTERISTICS

OPERATING PRINCIPLES

The NGV17 is a hinged-armature-type relay that operates by electromagnetic attraction. The contacts are opened and closed by the movement of an armature which is restrained by an opening spring and operated by the DC solenoid. The high dropout feature results from the characteristic of the zener diode regulator.

The NGV17 relay pickup can be adjusted by means of the variable resistor, R1. The relay will pick up at 105% or less of dropout voltage.

BURDEN

The resistances of the DC windings are given in Figures 3, 4, and 5.

The current at rated volts when set for minimum dropout is given in Table III. If the relay is set for a higher dropout, then the current at rated volts will be less.

TABLE III

RATED VOLTS	MAXIMUM CURRENT
250	.02
125	.02
48	.066
24	.03

**CONSTRUCTION**

The telephone-type voltage unit, the fixed and variable resistors and the zener regulator are mounted on a compound base, and the cover is attached to the front of this base. See Figures 6, 7, and 8 for dimensions and panel drilling.

**RECEIVING, HANDLING AND STORAGE**

These relays, when not included as part of a control panel, will be shipped in cartons designed to protect them against damage. Immediately upon receipt of a relay, examine it for any damage sustained in transit. If injury or damage resulting from rough handling is evident, file a damage claim at once with the transportation company and promptly notify the nearest General Electric Sales Office.

Reasonable care should be exercised in unpacking the relay in order that none of the parts are broken or the adjustments disturbed.

If the relays are not to be installed immediately, they should be stored in their original cartons in a place that is free from moisture, dust and metallic chips. Foreign matter collected on the outside of the case may find its way inside when the cover is removed, and cause trouble in the operation of the relay.

**ACCEPTANCE TESTS**

Immediately upon receipt of the relay, an inspection and acceptance test should be made to ensure that no damage has been sustained in shipment.

VISUAL INSPECTION

Check the nameplate stamping to ensure that the model number, rating and calibration range of the relay received agree with the requisition.

Remove the relay from its case and check by visual inspection that there are no broken or cracked molded parts or other signs of physical damage, and that all screws are tight.

MECHANICAL INSPECTION

It is recommended that the following mechanical adjustments be checked:

1. Operate the armature by hand; allow it to reset to ensure that all parts are free from friction or binding.
- 2.† With the relay de-energized, each normally-open contact should have a gap of .015" or more. Observe the wipe on each normally-closed contact by deflecting the stationary contact member towards the frame. Wipe should be approximately .005".

The wipe on each normally-open contact should be approximately .005". This can be checked by inserting a .005" shim between the residual screw and the pole piece and operating the armature by hand. The normally-open contacts should make before the residual screw strikes the shim.

**INSTALLATION PROCEDURE**

If, after the performance of the **ACCEPTANCE TESTS**, the relay is held in storage before shipment to the job site, it is recommended that the visual and mechanical inspection described in the section on **ACCEPTANCE TESTS** be repeated before installation.

Also, the relay should be set at the dropout value to be used, and it should be checked. When making this check, the relay should be installed in its permanent location and preheated. After the dropout is set, check that the relay will pick up at the lowest acceptable battery charger output voltage. Also check that the contact adjustment is correct (see section on **ACCEPTANCE TESTS**).

**PERIODIC CHECKS AND ROUTINE MAINTENANCE**

In view of the vital role of protective relays in the operation of a power system, it is important that a periodic test program be followed. It is recognized that the interval between periodic checks will vary depending upon environment, type of relay and the user's experience with periodic testing. Until the user has accumulated enough experience to select the test interval best suited to his individual requirements, it is suggested that the following points be checked at an interval of from one to two years.

† Revised since last issue

### MECHANICAL CHECKS

Manually operate the armature and allow it to reset, to make sure that there is no excessive friction or tendency to bind.

Check the contact gap and wipe; values should agree with those given in the section under **ACCEPTANCE TESTS**.

Examine the contact surfaces for signs of tarnishing or corrosion.

Set the battery charger at its lowest charging rate and check the pickup and dropout. The pickup voltage should be 106% or less of the dropout voltage. A voltmeter with at least 1000 ohms per volt should be used for making the test. If it is necessary to make adjustments, refer to the section on **SERVICING**.

### **SERVICING**

If any of the mechanical or electrical check points described in the previous sections are found to be out of limits, the following points should be observed in restoring them.

The pickup voltage is adjusted by changing the setting of the variable resistor, R1. The ratio of pickup to dropout can be changed by turning the residual screw. The minimum gap must be 0.002 inch between armature and pole face.

For cleaning fine silver contacts, a flexible burnishing tool should be used. This consists of an etched roughened strip of flexible metal, resembling a superfine file, which removes corroded material quickly without scratching the surface. The flexibility of the tool insures the cleaning of the actual points of contact. Never use knives, files, or abrasive paper or cloth to clean fine silver contacts. A burnishing tool as described above can be obtained from the factory.

### **RENEWAL PARTS**

It is recommended that sufficient quantities of renewal parts be carried in stock to enable the prompt replacement of any that are worn, broken or damaged.

When ordering renewal parts, address the nearest Sales Office of the General Electric Company, specify quantity required, name of the part wanted, and give complete nameplate data. If possible, give the General Electric requisition number on which the relay was furnished.

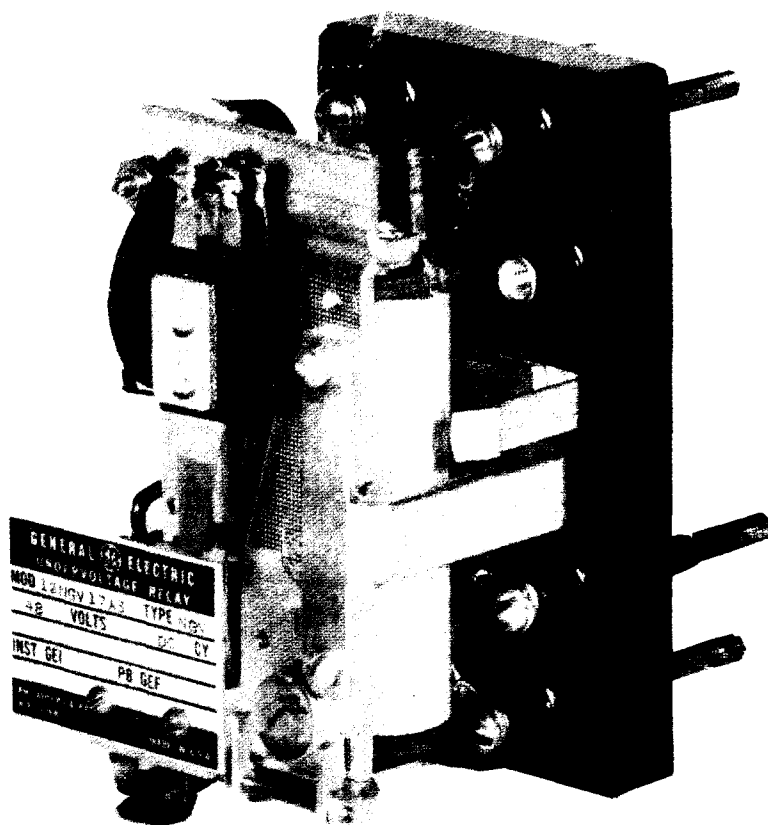


Figure 1 (8031286) NGV17A Relay Removed from Case, Front Right Oblique View

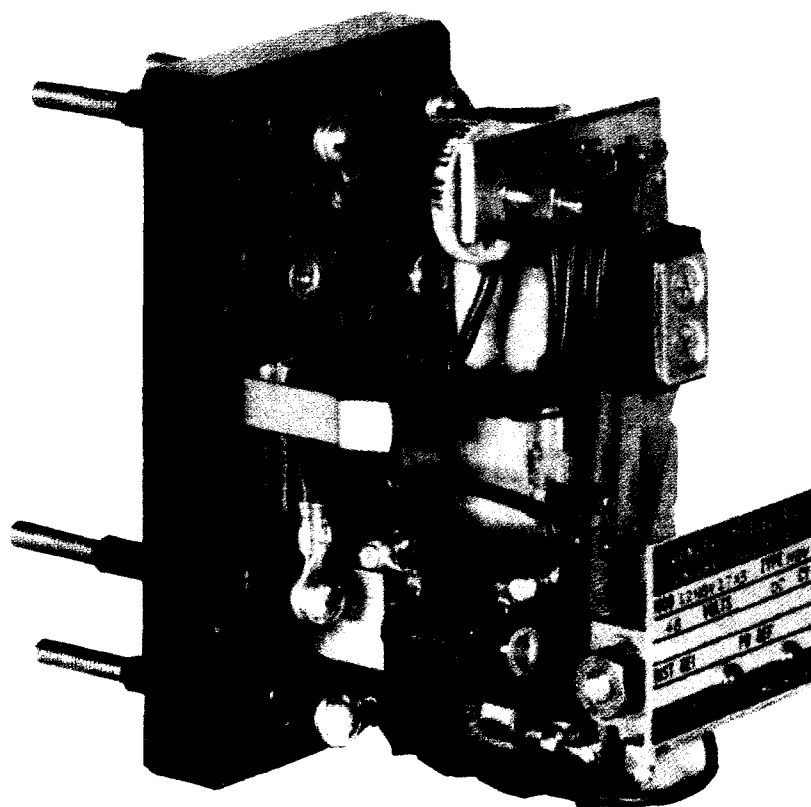
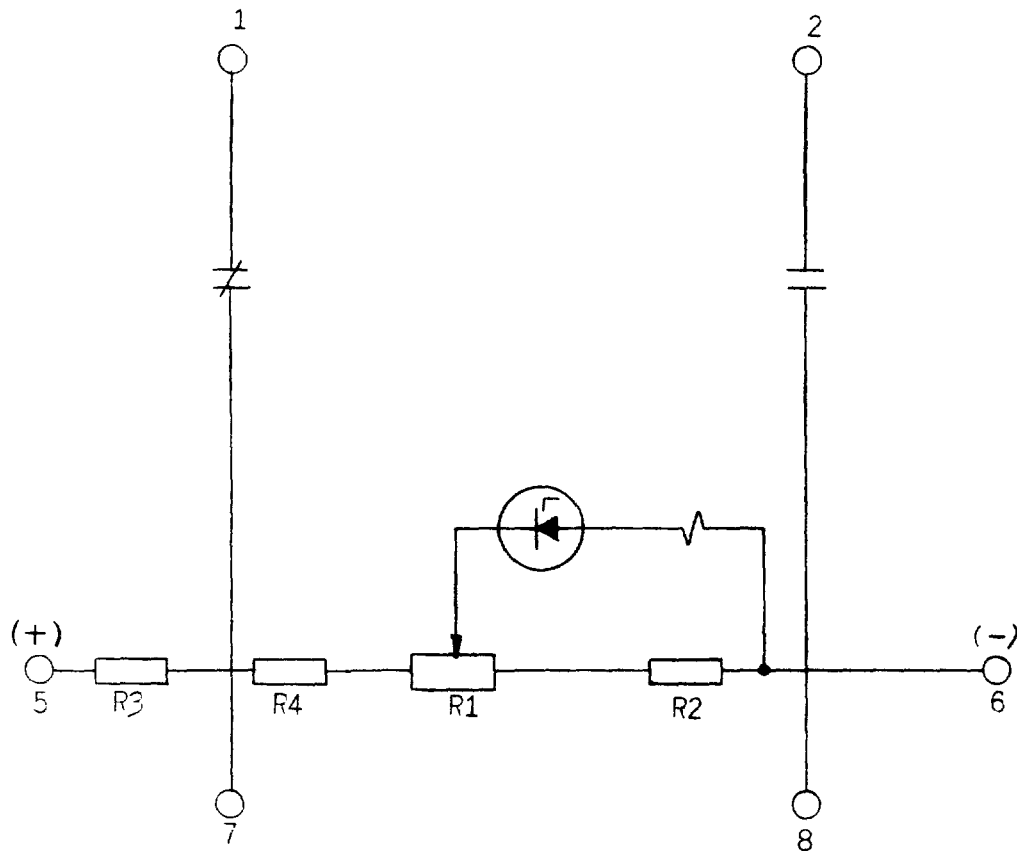


Figure 2 (8031287) NGV17A Relay Removed from Case, Front Left Oblique View

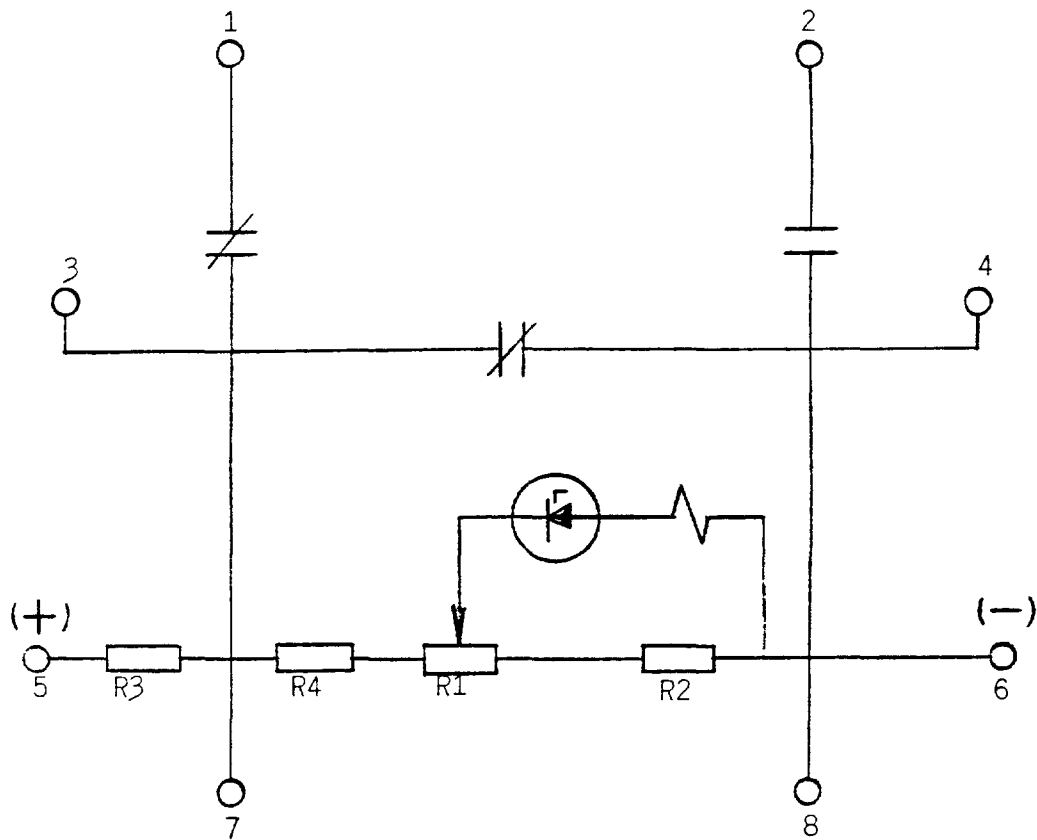


BACK VIEW

MODEL	R1	R2	R3	R4
12NGV17A1	5,000	10,000	3,500	3,500
12NGV17A2	5,000	7,500	—	—
12NGV17A3	1,000	2,000	—	—
12NGV17A4	5,000	10,000	2,500	2,500
12NGV17A5	1,000	2,000	-	-
12NGV17A6	5,000	10,000	-	1,000
12NGV17A7	5,000	10,000		1,000
12NGV17A8				
12NGV17A9	1,000	2,000	-	-
12NGV17A10	25	30	-	-

Figure 3 (0165A7517-5) Internal Connection Diagram and Table of Resistance Values for the NGV17A Relay

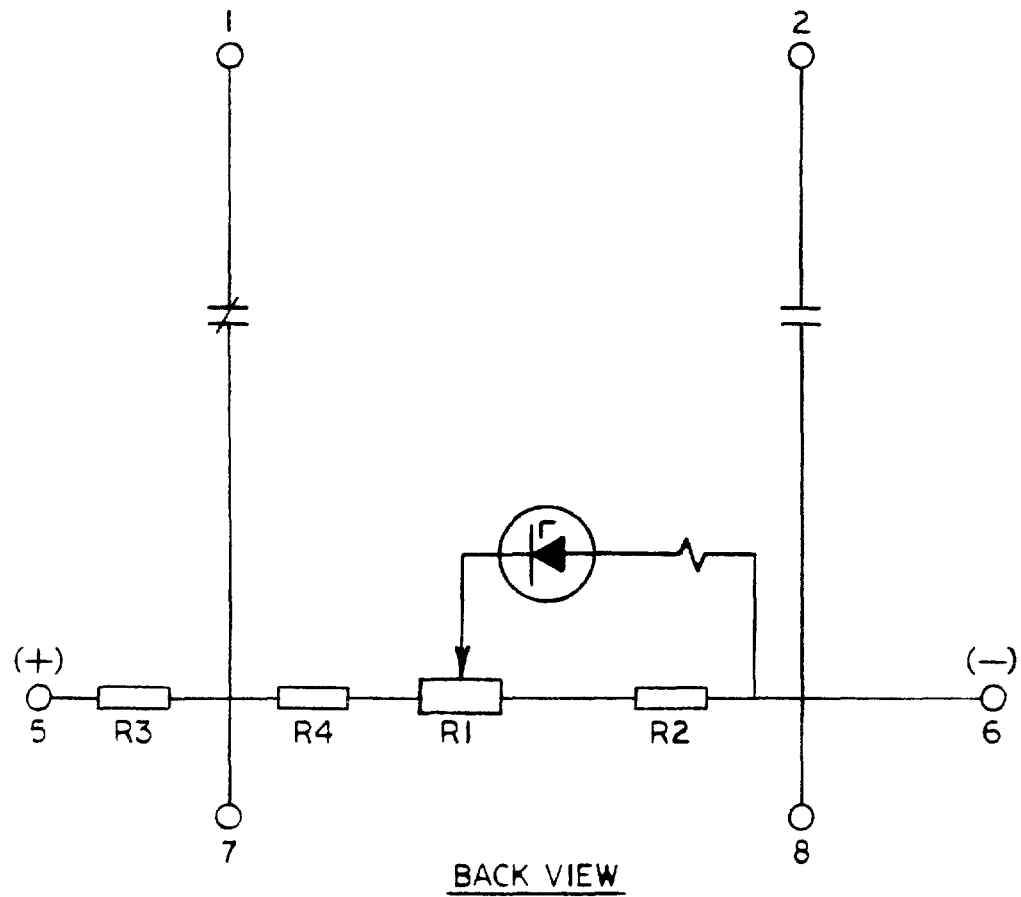




BACK VIEW

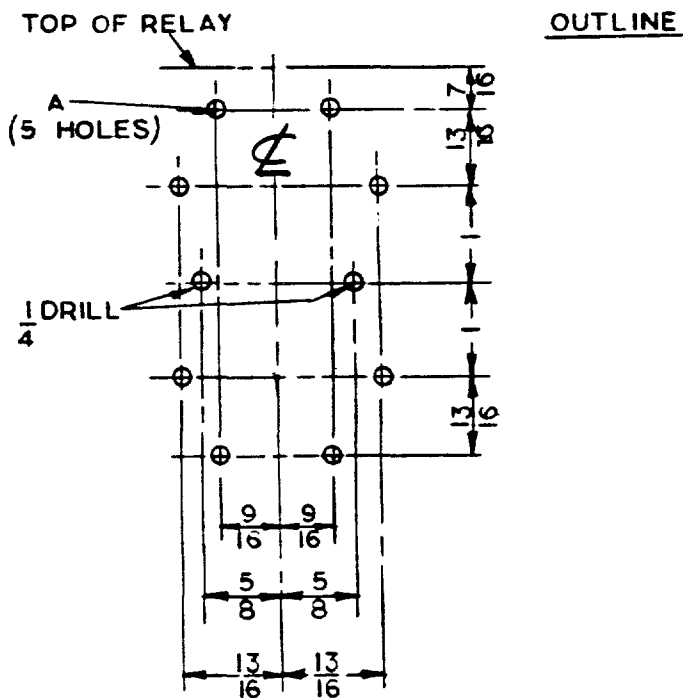
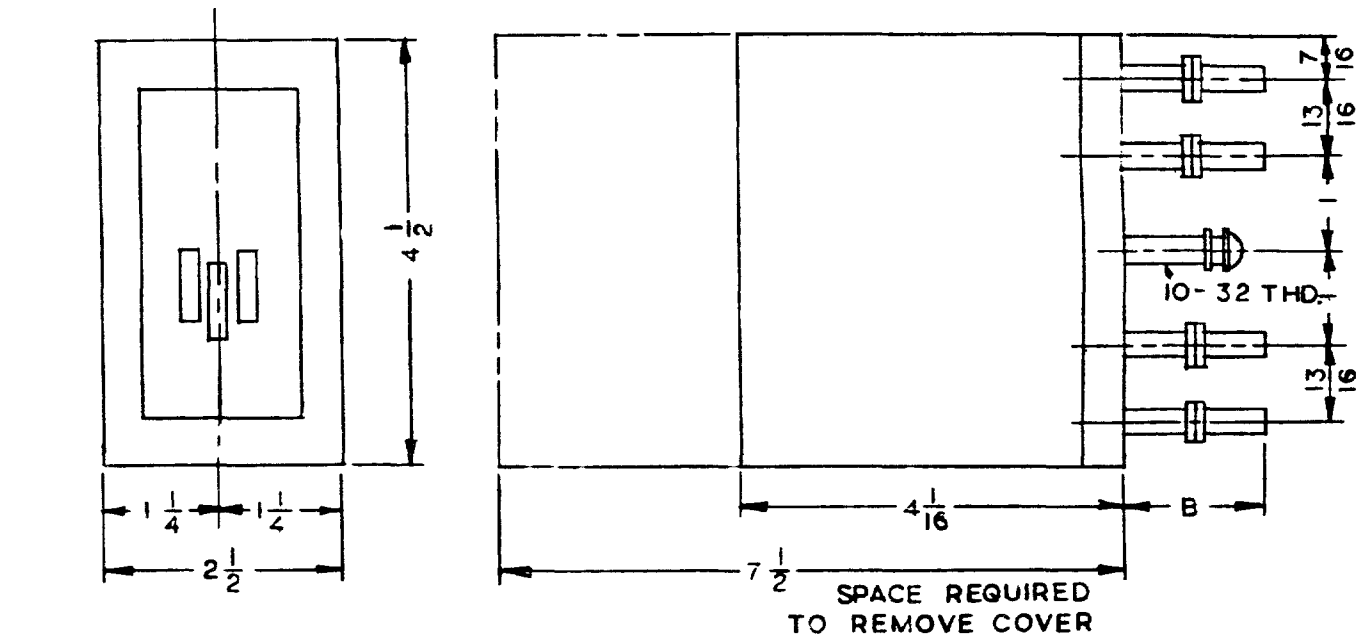
MODEL	R1	R2	R3	R4
12NGV17B2,4	5,000	7,500	—	—
12NGV17B3,5	5000	10,000	2500	2500
12NGV17B1	1500	2000	—	—

Figure 4 (0203A8691-4) Internal Connection Diagram and Table of Resistance Values for the NGV17B Relay



MODEL	R1	R2	R3	R4
12NGV17C1	5K $\Omega$	7.5K $\Omega$	—	—
12NGV17C2	5K $\Omega$	10K $\Omega$	2.5K $\Omega$	2.5K $\Omega$
12NGV17C3	1K $\Omega$	2K $\Omega$	—	—

Figure 5 (0257A9610-0) Internal Connection Diagram and Table of Resistance Values for the NGV17C Relay



TYPE OF PANEL	A	B
INSULATING	7/16	2-13/16
STEEL	9/16	1-3/8

PANEL DRILL (FRONT VIEW)

Figure 6 (0148A3979-6) Outline and Drilling Dimensions for the Projection Mounted NGV17A or NGV17B Relay

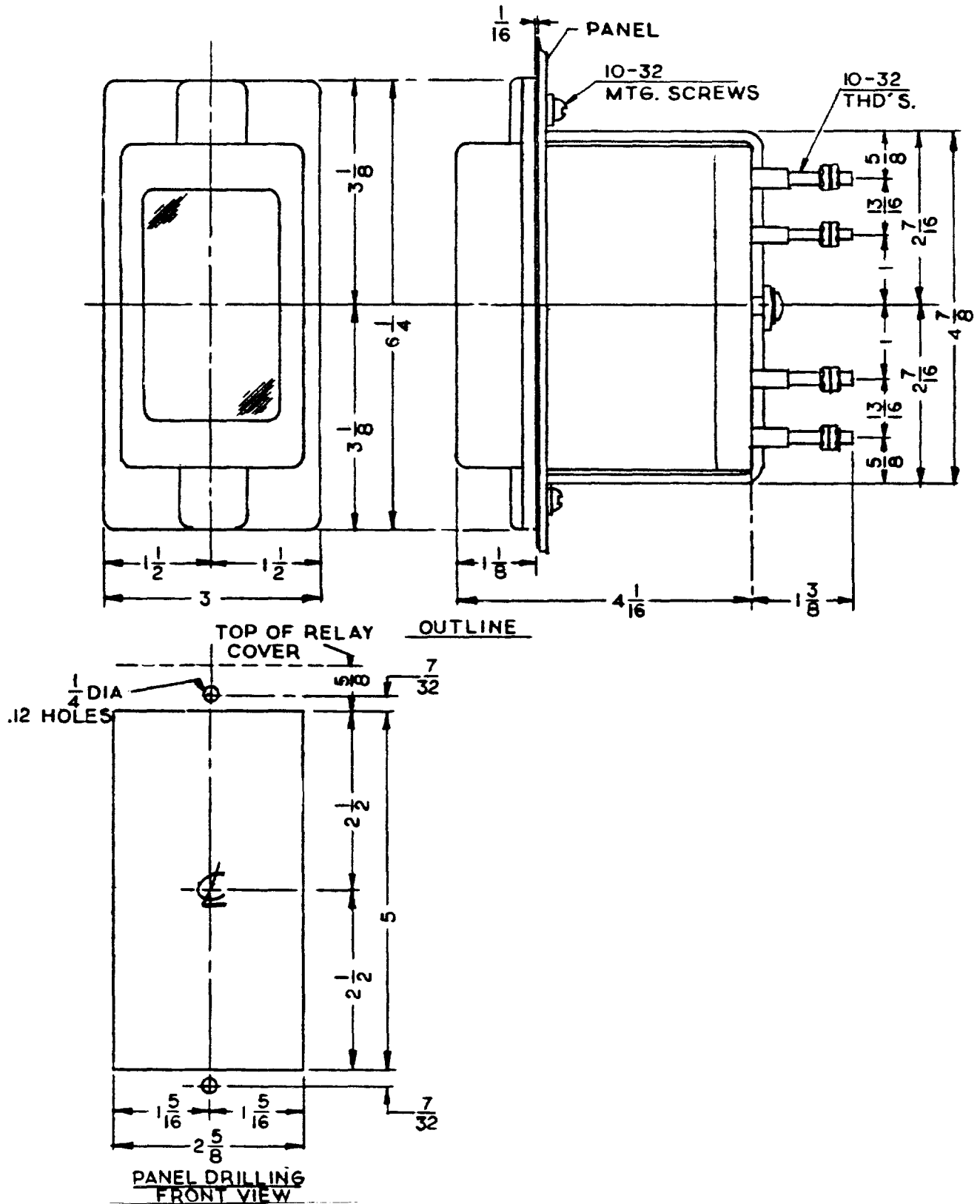


Figure 7 (0148A3978-7) Outline and Drilling Dimensions  
for the Semi-flush Mounted NGV17A or NGV17B Relay

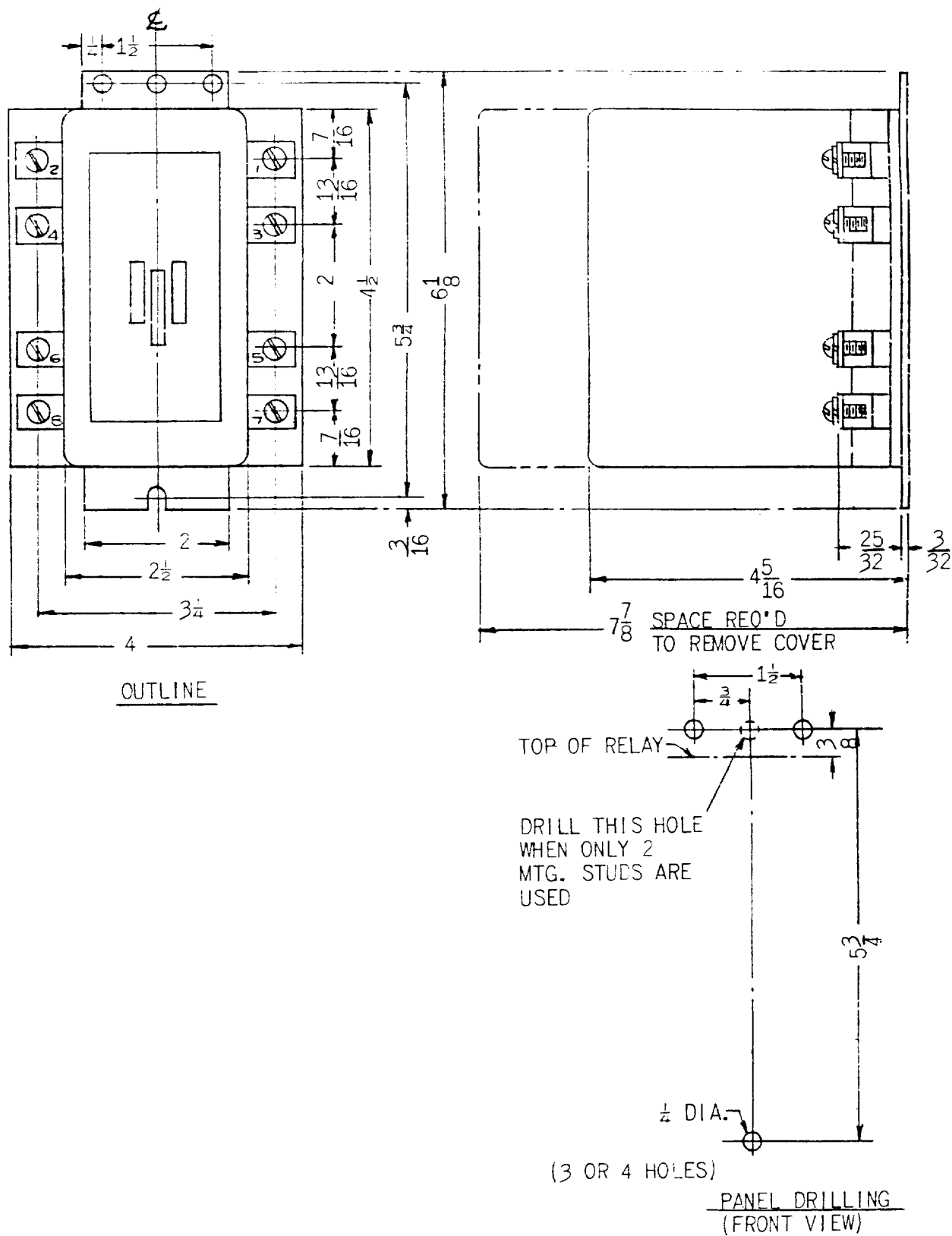


Figure 8 (0208A3642-1) Outline and Drilling Dimensions  
for the Front Connected NGV17C Relay

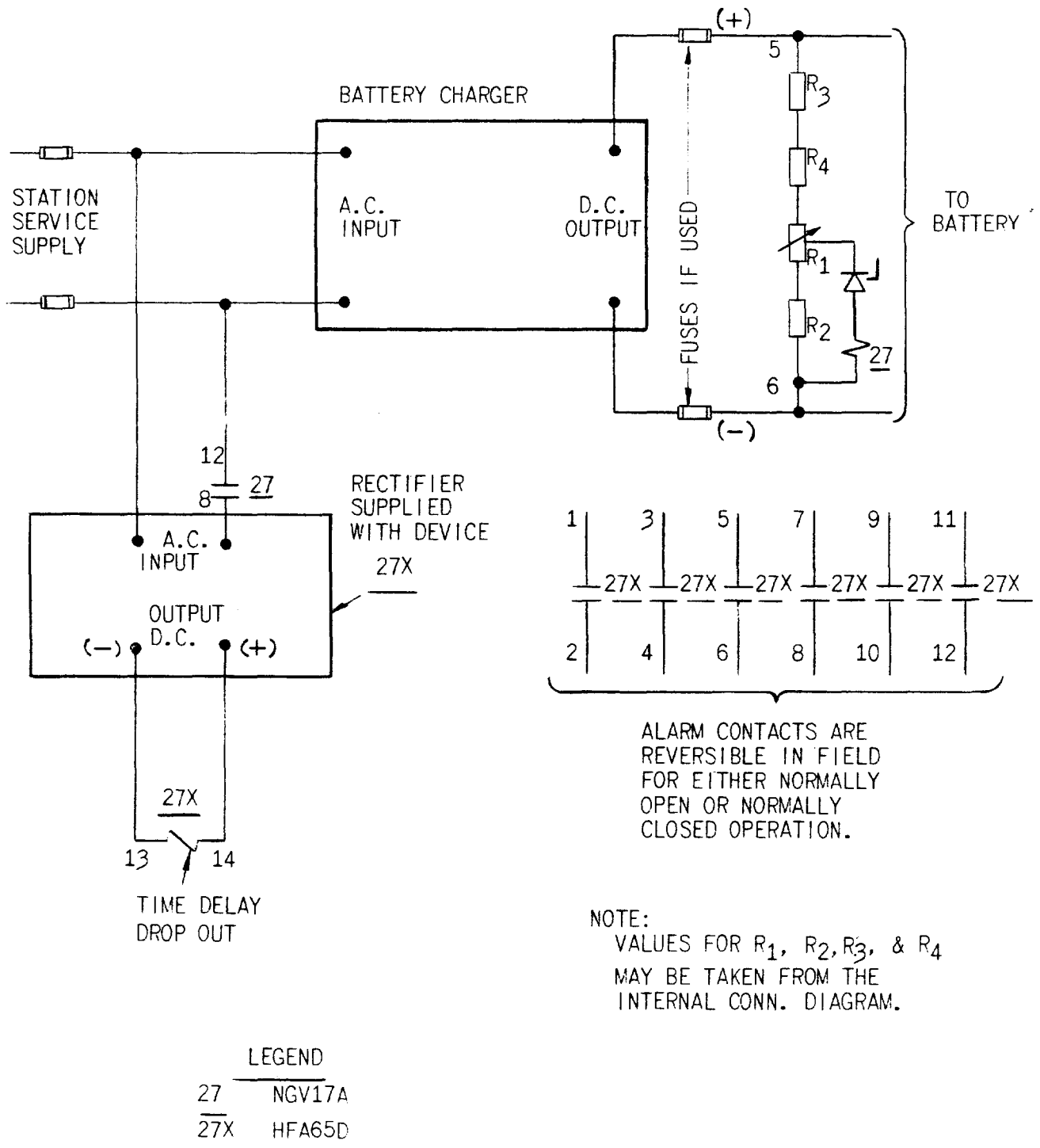


Figure 9 (0165A7553-0) External Connections for the NGV17 Relay with HEA65D Relay for Low Battery Voltage Indication





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